

# PMS Parent's Club Meeting

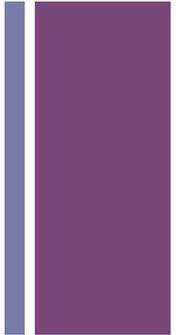
Common Core Math Discussion  
December 12, 2014



# Common Core Math

## *A Shift from the CA State Standards to the Common Core Content and Practice Standards*

- With the implementation of the CCSS, over the course of the next several years, teachers will shift their teaching practices and curriculum. Speaking specifically about the Common Core Math Standards ... at all levels, students will focus on fewer math concepts and principles, and will be expected to develop greater mastery and conceptual understanding of each. There will be greater emphasis on understanding the connections among different math concepts, within and between grade levels.



# + Common Core Math

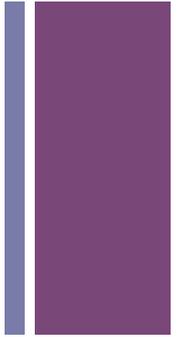
## *A Shift in Focus*

- **Greater focus on fewer topics**
- The Common Core calls for greater focus in mathematics.
- Rather than racing to cover many topics in a mile-wide, inch-deep curriculum, the standards ask math teachers to significantly narrow and deepen the way time and energy are spent in the classroom.
- This focus will help students gain strong foundations, including a solid understanding of concepts, a high degree of procedural skill and fluency, and the ability to apply the math they know to solve problems inside and outside the classroom.

# + Common Core Math

## *A Shift in Coherence*

- **Coherence: Linking topics and thinking across grades**
- Mathematics is not a list of disconnected topics, tricks, or mnemonics; it is a coherent body of knowledge made up of interconnected concepts. Therefore, the standards are designed around coherent progressions from grade to grade.
- Learning is carefully connected across grades so that students can build new understanding onto foundations built in previous years. Each standard is not a new event, but an extension of previous learning.

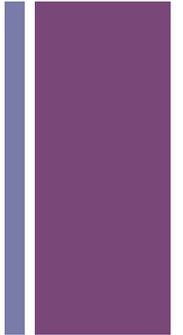


# + Common Core Math

## *A Shift in Rigor*

- **Rigor: Pursue conceptual understanding, procedural skills and fluency, and application with equal intensity**
- Rigor refers to deep, authentic command of mathematical concepts, not making math harder or introducing topics at earlier grades.
  - *Conceptual understanding:* Students must be able to access concepts from a number of perspectives in order to see math as more than a set of mnemonics or discrete procedures.
  - *Procedural skills and fluency:* The standards call for speed and accuracy in calculation.
  - *Application:* The standards call for students to use math in situations that require mathematical knowledge.

# + Common Core Math



- In addition to the *content* standards (such as multiplication or percentages), Common Core establishes standards for the *practice* of math. Students will be expected to develop greater problem-solving and reasoning skills, and explain and defend their thinking.
- At all levels, teachers will incorporate “performance tasks” that require students to apply their knowledge and demonstrate their conceptual understanding of math concepts.

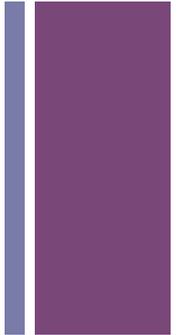


# Common Core Practice Standards

Standard for Mathematical Practice	Student Friendly Language
1. Make sense of problems and persevere in solving them.	I can try many times to understand and solve a math problem.
2. Reason abstractly and quantitatively.	I can think about the math problem in my head first.
3. Construct viable arguments and critique the reasoning of others.	I can make a plan, called a strategy, to solve the problem and discuss other students' strategies too.
4. Model with mathematics.	I can use math symbols and numbers to solve the problem.
5. Use appropriate tools strategically.	I can use math tools, pictures, drawings, and objects to solve the problem.
6. Attend to precision.	I can check to see if my strategy and calculations are correct.
7. Look for and make use of structure.	I can use what I already know about math to solve the problem.
8. Look for and express regularity in repeated reasoning.	I can use a strategy that I used to solve another math problem.

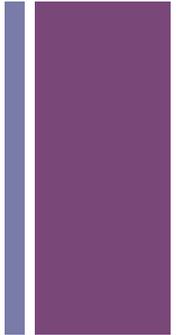
# + New Courses for 2014-15

- In the spring of 2014, the PUSD Board of Education adopted three new courses:
  - Common Core 6 Math
  - Common Core 7 Math
  - Common Core 8 Math



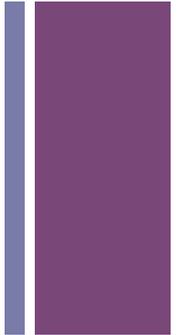
# + Common Core Math

- PUSD developed the Math Task Force (parents, students, teachers, and administrators).
- We are charged by the PUSD Board of Education to research, review, and recommend PUSD Math Pathways to the Superintendent and the Board of Education for consideration and implementation in 2015-16.
  - Compression opportunity at PMS
  - Compression opportunity at PHS/MHS
  - Pathway to AP Calculus AB & BC
  - Multiple entry compression entry points



# + Common Core Math

- Although the CCSS have been adopted by the State of California, and each school district in the State is working toward implementation, individual school districts have discretion over certain aspects of implementation.
- For example, each district has discretion to follow either a “traditional” or “integrated” model for teaching algebra and geometry.
- The **traditional pathway** reflects a higher mathematics model typically seen in the U.S. This model consists of two algebra courses and a model geometry course. All three courses include statistics and probability standards.
- The **integrated pathway** is typically seen internationally and consists of a sequence of three model courses, each of which includes algebra, geometry and statistics standards.
- Students enrolled in either pathway should arrive at **the same point** by the end of their third year of higher mathematics instruction.



*Courses in higher level mathematics:*  
Pre-calculus, AP Calculus, AP Statistics, or courses designed for career technical programs of study.



Algebra II

Geometry

HS Algebra I

**TRADITIONAL Naming Pathway**  
(Typical *in* U.S.)

2 Algebra courses, 1 Geometry course, with Probability and Statistics interwoven



Mathematics III

Mathematics II

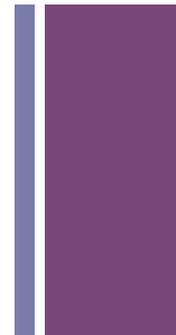
Mathematics I

**INTEGRATED Naming Pathway**  
(Typical *outside* of U.S.)

3 courses that attend to Algebra, Geometry, and Probability and Statistics each year

# + Common Core Math

- Each district will also have the discretion to determine course sequencing and progressions ... how and when students move from one math course to the next. This also addresses how and when students may accelerate.
- Before we discuss course sequencing and progressions, it's important to understand that courses, like Algebra I, under the old standards, are very different in content, than courses, like Algebra I – CC, in the new standards.



# + 1997 CA Math Standards vs. Common Core Math Standards Math 5 (1997), Math 6 (1997) and CC-6

Grade 5 (1997 Standards)	Grade 6 (1997 Standards)	Grade 5 CC	Grade 6 CC
<b>Number Sense</b>	<b>Number Sense</b>	<b>Operations and Algebraic Thinking</b>	<b>Ratio and Proportion</b>
Positive/Negative Numbers	Positive/Negative Numbers	Order of Operations	Single Step Real World Problems
Addition/Subtraction/Multi/Div Fractions	Addition/Subtraction/Multi/Div Fractions	Analyze Patterns	Percentages Problems
Decimal/Percents	Percentage Problems		Units
Rounding	Ratio and Proportion	<b>Number Operations in Base 10</b>	<b>Number System</b>
Prime Factors		Place Value with Fractions (1/100)	Positive/Negative Numbers
		Division w/ Whole Number Quotients	Addition/Subtraction/Multi/Div Fractions
<b>Algebra + Functions</b>	<b>Algebra + Functions</b>	Order of Operations	Order of Operations
One Step Linear (Int only)	One Step Linear (Incl Fractions)	Decimal/Percents	Greatest Common Factor
Distributive Property	Order of Operations		Absolute Value
Graphs and Tables (Coord Pairs)	Graphs and Tables (Ratio)	<b>Number Operations Fractions</b>	Graphs and Tables (Equations)
	Describe Geometry Algebraically	Addition/Subtraction/Multi/Div Fractions	<b>Expressions and Equations</b>
		Real World Fraction Problems	Exponents
<b>Measurement + Geometry</b>	<b>Measurement + Geometry</b>		One Step Linear (Incl Fractions)
Solid Shapes (Classify)	Solid Shapes (Simple Volume)	<b>Measurement &amp; Data</b>	Inequalities
Angles	Angles	Units	<b>Geometry</b>
Units		Solid Shapes (Rectangular Prism)	Solid Shapes (Most Objects)
		Line Plots with Fractions	Triangles and Quads
<b>Statistics and Data Analysis</b>	<b>Statistics and Data Analysis</b>		Pythagorean Theorem
Mean, Median, Mode	Mean, Median, Mode	<b>Geometry</b>	Perimeter + Area
Display Data on Graphs	Prediction	Graphs and Tables (Coord Pairs)	<b>Statistics and Probability</b>
	Sampling	Solid Shapes (Classify)	Variability in Sampling
		Angles	Means and Variances
			Distributions

## Key

Grade 5 (1997 Standards)
Grade 6 (1997 Standards)
Grade 7 (1997 Standards)
Grade 8 Algebra 1 (1997 Standards)
Geometry (1997 Standards)
New Common Core Content

# + 1997 CA Math Standards vs. Common Core Math Standards Pre-Algebra (1997) - CC-7 Math

Grade 7 (1997 Standards)	
<b>Number Sense</b>	
	Positive/Negative Numbers
	Addition/Subtraction/Multi/Div Fractions
	Percentage Problems
	Integer Exponents
	Scientific Notation
<b>Algebra + Functions</b>	
	One Step Linear
	Order of Operations
	Graphs and Tables (Equations)
	Powers
	Inequalities
<b>Measurement and Geometry</b>	
	Solid Shapes (Most Objects)
	Perimeter + Area
	Units
	Pythagorean Theorem
<b>Statistics and Data Analysis</b>	
	Data Relationships

Grade 7 CC	
<b>Ratio and Proportion</b>	
	Rates
	Multi-Step real world Problems
<b>Number System</b>	
	Rational Number Line Operations
	Absolute Value
	Multiplication/Division of Fractions
	Graphing Equivalent Ratios
<b>Expressions and Equations</b>	
	Percentage-Variable Addition Relationship
	Construct Equations
	Graphing Inequalities
<b>Geometry</b>	
	Scaling Drawings
	Construct Triangles
	2D to 3D transformations
	Area of a Circle
	Angles
	Solid Shape Volumes + Surface Area
<b>Statistics and Probability</b>	
	Data Analysis
	Visual Overlap
	Variability Inferences
	Probability Models

Key
Grade 5 (1997 Standards)
Grade 6 (1997 Standards)
Grade 7 (1997 Standards)
Grade 8 Algebra 1 (1997 Standards)
Geometry (1997 Standards)
New Common Core Content

# + 1997 CA Math Standards (Pre-Algebra) vs. CC Math Standards

## Pre-Algebra (1997), CC-8 Math & CC-Alg I

Grade 7 (1997 Standards)	
<b>Number Sense</b>	
	Positive/Negative Numbers
	Addition/Subtraction/Multi/Div Fractions
	Percentage Problems
	Integer Exponents
	Scientific Notation
<b>Algebra + Functions</b>	
	One Step Linear
	Order of Operations
	Graphs and Tables (Equations)
	Powers
	Inequalities
<b>Measurement and Geometry</b>	
	Solid Shapes (Most Objects)
	Perimeter + Area
	Units
	Pythagorean Theorem
<b>Statistics and Data Analysis</b>	
	Data Relationships

Grade 8 CC	
<b>Real Numbers</b>	
	Irrational Numbers
<b>Expressions and Equations</b>	
	Exponents
	Powers
	Scientific Notation
	Connections (Lines and Linear Eq)
	System of Linear Equations
	Graphically Solve Systems of Linear Eq
<b>Geometry</b>	
	Congruence
	Scaling
	Rotations
	Pythagorean Theory Proofs
<b>Functions</b>	
	Define/Compare Functions
	Non-Linear Functions
	Construct Functions
<b>Statistics and Probability</b>	
	Scatter Plots
	Line of Best Fit
	Frequencies

Algebra I CC	
	Int + Variable Exponents
	Powers and Radicals
	Units
	Operations with mono-polynomials
	Create Equations (One Variable)
	Create Equations (Two Variables)
	Factoring Algebraic Functions
	Graphically Solve Linear Equations
	Quadratic Equations
	Systems of 1 Linear, 1 Quad Equation
	Range + Domain
	Rate of Change of Function
	Build Functions
	Inverse Functions
	Exponential Functions
	Statistics and Probability
	Std. Dev, Interquartile Ranges
	Scatter Plot
	Slope + Intercept

Key
Grade 5 (1997 Standards)
Grade 6 (1997 Standards)
Grade 7 (1997 Standards)
Grade 8 Algebra 1 (1997 Standards)
Geometry (1997 Standards)
New Common Core Content

# +1997 CA Math Standards vs. Common Core Math Standards Alg I (1997), CC-8 Math and CC-Alg I

Grade 8 Algebra 1 (1997 Standards)
<b>All Algebra Content</b>
Powers and Radicals
Int + Variable Exponents
Absolute value
Linear Equations
Intercepts
Equation of a Line
Parallel/Perpendicular
Graphically Solve Linear Eq
Operations with mono-polynomials
Factoring Algebraic Fractions
Quadratic Equations
Functions
Range + Domain
Quadratic Graphs + Complete Sq.

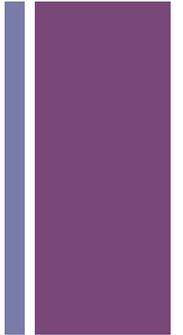
Key
Grade 5 (1997 Standards)
Grade 6 (1997 Standards)
Grade 7 (1997 Standards)
Grade 8 Algebra 1 (1997 Standards)
Geometry (1997 Standards)
New Common Core Content

Grade 8 CC
<b>Real Numbers</b>
Irrational Numbers
<b>Expressions and Equations</b>
Exponents
Powers
Scientific Notation
Connections (Lines and Linear Eq)
System of Linear Equations
Graphically Solve Systems of Linear Eq
<b>Geometry</b>
Congruence
Scaling
Rotations
Pythagorean Theory Proofs
<b>Functions</b>
Define/Compare Functions
Non-Linear Functions
Construct Functions
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Scatter Plots
Line of Best Fit
Frequencies

Algebra I CC
Int + Variable Exponents
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Create Equations (One Variable)
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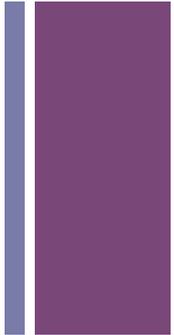
# Information Available on the PUSD Website



- Additionally, PUSD has developed a timeline for future [parent engagement opportunities](#) on Common Core Math.
- [Common Core Mathematics Options: Assessing Traditional & Integrated Curricular Possibilities](#), A Report for the PUSD Mathematics Task Force, Cheryl Holzmeyer, Ph.D.
- [“Why Students in US Need Common Core Math.”](#) Presented by Stanford Math Professor, Dr. Jo Boaler
- [Dec. 1st Parent Education Night - Presentation By David Foster, Executive Director - SVM](#)
- [PUSD Common Core Math FAQ - Updated March 31, 2014](#)
- [Summary of May 28, 2014 - Math Pathway Decisions - PUSD Board of Education Meeting](#)
- [Math Pathway Options 5-14-14 Board of Education meeting](#)



# Research Available on the PUSD Website



## ■ Integrated Approach vs. Traditional Approach

- [Common Core Mathematics Options: Assessing Traditional & Integrated Curricular Possibilities](#), A Report for the PUSD Mathematics Task Force, Cheryl Holzmeyer, Ph.D.
- [Curriculum and Implementation Effects on High School Students' Mathematics Learning From Curricula Representing Subject-Specific and Integrated Content Organizations](#) – 2013
- [Districts Split on High School Math Choices, 2014](#)
- [Responding to Calls for Change in High School Mathematics: Implications for Collegiate](#)
- [Interactions among Instructional Practices, Curriculum, and Student Achievement: The Case of Standards-Based](#)
- [High School Mathematics Pathways: Helping Schools and Districts Make an Informed Decision about High School](#)
- [Inquiry Based Mathematics Instruction Versus Traditional Mathematics Instruction: The Effect on Student Understanding and Comprehension in an Eighth Grade Pre-Algebra Classroom](#)
- [Mathematics Education in Singapore: How can Mathematics Education in Singapore inform Mathematics Education in US](#)
- [Teachers' Conceptions of Integrated Mathematics Curricula](#)

## ■ Math Reform

- [Improving Students' College Math Readiness: Postsecondary Interventions and Reforms](#)
- [Effective Programs in Middle and High School Mathematics: A Best-Evidence Synthesis](#)

## ■ Benefits of Acceleration for Gifted Students

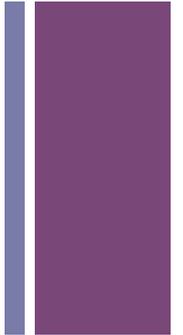
- [A 10-Year Longitudinal Follow-up of Participants in a Fast-Paced Mathematics Course](#) – 1994
- [Academically Talented Students' Achievement in a Flexibly Paced Mathematics Program](#) – 1991

## ■ Benefits of Early Algebra

- [Early acceleration of students in mathematics: Does it promote growth and stability of growth in achievement across mathematical areas?](#) – 2005
- [The Impact of Early Algebra: Results from a Longitudinal Intervention](#) – 2013
- [A longitudinal assessment of early acceleration of students in mathematics on growth in mathematics achievement](#) - 2004



# Parent Engagement Opportunities



Date & Time	Parent Engagement Events
Dec. 1 <sup>st</sup> – 7pm	PUSD Parent Education Night - CC Math Update
Dec. 3 <sup>rd</sup> – 9am	PHS Parent's Club Board Meeting - CC Math Update
Dec. 3 <sup>rd</sup> – 6:30pm	MHS Parent's Club Meeting - CC Math Update
Dec. 9 <sup>th</sup> – 3:30pm	PMS Site Council Meeting - CC Math Update
Dec. 12 <sup>th</sup> – 9am	PMS Parent's Club Board Meeting - CC Math Update
Dec. 18 <sup>th</sup> – 3:30pm	PHS Site Council Meeting - CC Math Update
Jan. 7 <sup>th</sup> – 7pm	PUSD Parent Education Night - CC Math Update
Jan. 14 <sup>th</sup> – 7pm	PUSD School Board Meeting – CC Math Update
Jan. 22 <sup>nd</sup> – 7pm	PUSD Parent Education Night – CC Math Update
Jan. 27 <sup>th</sup> – 7:30pm	Education Speaker Series – Dan Meyer discusses Common Core Math and the importance and method of teaching students to formulate and solve problems rather than memorize and apply formulas.
Feb. 11 <sup>th</sup> – 7pm	PUSD School Board Meeting – Math Task Force Presentation on Math Pathway Recommendations
Mar. 11 <sup>th</sup> – 7pm	PUSD School Board Meeting – Math Task Force Presentation on Math Pathway Recommendations (2 <sup>nd</sup> Reading)

# + Compression & Expansion Opportunities

- Many, many options ... let's discuss

